

day 18

Q #11)

$$\lim_{x \rightarrow -2} \frac{2 - |x|}{x + 2}$$

$$|x| = \begin{cases} y = -x, x < 0 \\ y = x, x \geq 0 \end{cases}$$

$$= \lim_{x \rightarrow -2} \frac{2 - (-x)}{x + 2}$$

$$= \lim_{x \rightarrow -2} \frac{2 + x}{x + 2} = \lim_{x \rightarrow -2} 1 = \underline{1}$$

day 18

$$\lim_{x \rightarrow -2} \frac{2-|x|}{x+2} \cdot \frac{2+|x|}{(2+|x|)}$$

$$= \lim_{x \rightarrow -2} \frac{4 - (|x|)^2}{(x+2)(|x|+2)} = \lim_{x \rightarrow -2} \frac{4-x^2}{(x+2)(|x|+2)}$$

$$= \lim_{x \rightarrow -2} \frac{(2-x)(x+2)}{(x+2)(|x|+2)} = \lim_{x \rightarrow -2} \frac{2-x}{|x|+2} = \frac{4}{4} = 1$$

day 18

$$8) \lim_{x \rightarrow 3} \frac{\sqrt{5x+10}}{x-3} = \frac{5 \text{ ish}}{\text{close to } 0} \begin{cases} \rightarrow +\infty \\ \rightarrow -\infty \\ \text{DNE} \end{cases}$$

$$\lim_{x \rightarrow 3^-} \frac{\sqrt{5x+10}}{x-3} = -\infty$$

like in the case of 2.9 and all its brethren...

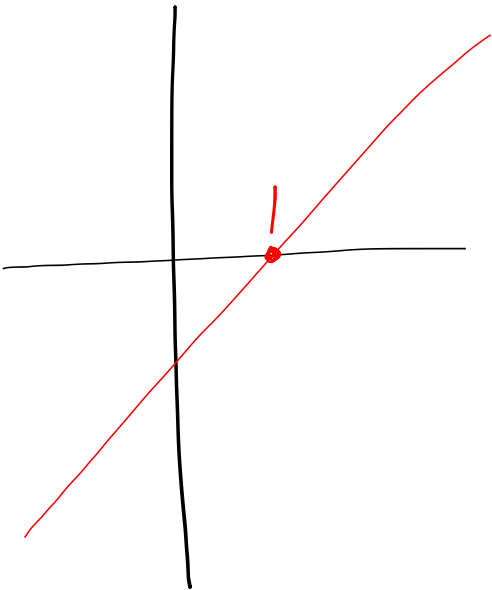
$$\lim_{x \rightarrow 3} \frac{\sqrt{5x+10}}{x-3} = \text{DNE}$$

$$\lim_{x \rightarrow 3^+} \frac{\sqrt{5x+10}}{x-3} = +\infty$$

$\rightarrow 0^+$

$$\lim_{x \rightarrow 2} \frac{(x-2)(x+2)}{(x-2)(x+1)} = \frac{x+2}{x+1} = \frac{4}{3}$$

day 18



AP exam

day 18

Multiple
Choicepart
A28g 55 min \leftarrow no calcpart
B17g 50 min \leftarrow calcFree
Response

part A

2g 30min \leftarrow calc

part B

4g 1 hr \leftarrow no calc9 pts each,
1 pt for each
good thing

day 18

Mathematica
Maple
Mat Lab → eng

day 18

$$9) f(x) = \begin{cases} x^2 - 3x + 6, & x < 2 \\ -x^2 + 3x + 1, & x \geq 2 \end{cases}$$

$$\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^-} x^2 - 3x + 6 = (2)^2 - 3(2) + 6 = 4 - 6 + 6 = 4$$

$$\lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2^+} -x^2 + 3x + 1 = -(2)^2 + 3(2) + 1 = -4 + 6 + 1 = 3$$

day 18

$$3.1/30 \quad f(x) = 2x^3; \quad a = 10$$

$$a) \quad f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

$$\begin{aligned} x^3 - 10^3 \\ = (x - 10) \\ \cdot (x^2 + 10x + 100) \end{aligned}$$

$$= \lim_{x \rightarrow 10} \frac{f(x) - f(10)}{x - 10} = \lim_{x \rightarrow 10} \frac{2x^3 - 2(10)^3}{x - 10}$$

$$= 2 \lim_{x \rightarrow 10} \frac{(x - 10)(x^2 + 10x + 100)}{x - 10}$$

$$= 2 \lim_{x \rightarrow 10} x^2 + 10x + 100 =$$

$$2(10^2 + 10^2 + 100) = 2(300) = 600$$

$$\left\{ \begin{aligned} \lim_{x \rightarrow a} cf(x) &= \\ c \lim_{x \rightarrow a} f(x) \end{aligned} \right.$$

b) $x = 10$, what is y ?

$$y = 2x^3; \quad 2x^3 \Big|_{x=10} = 2(10)^3 = \underline{2000}$$

$$P_1 = (10, 2000); \quad m = f'(10) = 600$$

eqn of tan line

$$y - y_1 = m(x - x_1)$$

$$y - 2000 = 600(x - 10)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

day 18

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$(x + h)^3 = x^3 + 3x^2h + 3xh^2 + h^3$$

day 18

$$8.1) \quad y = \frac{1}{t+1}, \quad t=1$$

$$f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

$$= \lim_{x \rightarrow a} \frac{\frac{1}{x+1} - \frac{1}{a+1}}{x - a} = \lim_{x \rightarrow a} \frac{\frac{1}{x+1} \left(\frac{a+1}{a+1} \right) - \frac{1}{a+1} \left(\frac{x+1}{x+1} \right)}{x - a}$$

$$= \lim_{x \rightarrow a} \frac{\frac{a+1}{(x+1)(a+1)} - \frac{x+1}{(x+1)(a+1)}}{x - a}$$

$$= \lim_{x \rightarrow a} \frac{\frac{a+1 - (x+1)}{(x+1)(a+1)}}{x - a} = \lim_{x \rightarrow a} \frac{\frac{a - x}{(x+1)(a+1)}}{x - a}$$

$$= \lim_{x \rightarrow a} \frac{-(x-a)}{(x+1)(a+1)} \cdot \left(\frac{1}{x-a} \right) = \lim_{x \rightarrow a} \frac{-1}{(x+1)(a+1)}$$

$$\frac{-1}{(a+1)^2}$$

$$= \frac{-1}{(a+1)(a+1)}$$

day 18

$$3.1/4^9) \quad f(x) = \sqrt{3x+1} \quad ; a=8$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{\sqrt{3(x+h)+1} - \sqrt{3x+1}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\sqrt{3(x+h)+1} - \sqrt{3x+1}}{h} \cdot \frac{\sqrt{3(x+h)+1} + \sqrt{3x+1}}{\sqrt{3(x+h)+1} + \sqrt{3x+1}}$$

$$= \lim_{h \rightarrow 0} \frac{(3(x+h)+1) - (3x+1)}{h(\sqrt{3(x+h)+1} + \sqrt{3x+1})} = \lim_{h \rightarrow 0} \frac{3h}{h(\sqrt{3(x+h)+1} + \sqrt{3x+1})}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{3}{\sqrt{3(x+h)+1} + \sqrt{3x+1}} = \frac{3}{2\sqrt{3x+1}}$$

b) write eqn of tangent line

$$f'(a) = f'(8) = \frac{3}{2\sqrt{3 \cdot 8 + 1}} = \frac{3}{2\sqrt{25}} = \frac{3}{10}$$

$$m = \frac{3}{10} \quad ; P = (8, \sqrt{3 \cdot 8 + 1}) = (8, 5)$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = \frac{3}{10}(x - 8)$$